

# THE MINERAL INDUSTRY OF ISRAEL

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Israel produced such metals and metal products as lead, magnesium, steel, and zinc and such industrial minerals as bromine, flint clay, gypsum, kaolin, magnesia, phosphate rock, potash, silica sand, and sulfur. Building materials produced in Israel included cement, crushed stone, marble, and sand. The country also cut imported diamond and other gemstones and produced bromine derivatives, caustic soda, fertilizers, natural gas, petroleum and petroleum products, phosphoric acid, and sulfuric acid.

In 2003, Israel's gross domestic product (GDP) at purchasing power parity amounted to \$133.9 billion. The GDP increased by 1.3% in 2003 after decreasing by nearly 1% in 2002. In 2003, the constant dollar value of production in the basic metal, mining and quarrying, and nonmetallic mineral products sectors fell by 11.2%, 3%, and 5.2%, respectively. Chemicals and refined petroleum accounted for 9.89% of industrial production; nonmetallic minerals, 3.74%; mining and quarrying, 2.74%; and basic metal, 2.08% (International Monetary Fund, 2004, p. 200; 2004<sup>§</sup>; Israel Central Bureau of Statistics, 2004, p. 115).

In 2003, Israel's gross exports amounted to \$31.78 billion. The value of mining and quarrying exports amounted to \$487.2 million; basic metal, \$238.5 million; fertilizers, \$233.3 million; refined petroleum products, \$137.3 million; and nonmetallic mineral products, \$131.5 million. Gross imports amounted to \$34.21 billion, of which fuels and lubricants accounted for about \$3.7 billion; and iron and steel, \$876.2 million.

## Commodity Review

### *Metals*

**Iron and Steel.**—Yehuda Steel Ltd. operated rolling mills at Ashdod and Gedera that produced rebar for domestic consumption. The company also produced crude steel. Israel-based Hod Metals operated a rolling mill at Kiryat Gat. In 2003, national imports of crude iron and steel, and manufactured iron and steel products rose to \$876.2 million from \$802 million in 2002.

The International Iron and Steel Institute (2004, p. 82, 92) estimated that Israel's imports of semimanufactured and finished steel products increased to 1.6 million metric tons (Mt) in 2002 from 1.51 Mt in 2001 and 1.21 Mt in 1997. From 1997 to 2002, Israel's apparent consumption of finished steel rose to nearly 1.84 Mt from 1.43 Mt.

**Lead.**—In 2003, Harkunas Lead Works, which was Israel's secondary lead smelter, increased its output to 25,000 metric tons (t) from 22,000 t in 2002. National lead consumption increased to 25,000 t in 2003 from 21,000 t in 2002 and 18,000 t in 2001 (International Lead and Zinc Study Group, 2004, p. 6, 8).

**Magnesium.**—Dead Sea Magnesium Ltd. (DSM) [a joint venture of Israel Chemicals Limited (ICL) (65%) and Volkswagen AG of Germany (35%)] was Israel's only producer of magnesium metal. In 2003, the United States imported about 6,000 t of magnesium metal from Israel, which was 22% of total U.S. imports of magnesium metal (Kramer, 2004).

Dead Sea Periclase Ltd. (DSP) (a subsidiary of ICL) used brines from the Dead Sea in the production of magnesia. In 2003, DSP reduced its production of refractory-grade magnesia. The United States imported 3,180 t of magnesia from Israel at a value of nearly \$6.7 million in 2003 compared with 8,740 t at a value of \$10.1 million in 2002 (Israel Chemicals Ltd., 2004, p. 12; Kramer, 2005, p. 47.12).

**Zinc.**—Numinor Chemical Industries Ltd. used zinc scrap to produce refined zinc ingots, zinc powder, zinc oxide, and other zinc-containing materials. The company exported its products to African, Asian, and European countries. In 2003, Israel consumed 13,000 t of refined zinc, which was unchanged from 2002 (International Lead and Zinc Study Group, 2004, p. 40).

### *Industrial Minerals*

**Bromine.**—Brines and carnallite from the Dead Sea were extracted by the Dead Sea Bromine Group (DSBG) (a subsidiary of ICL). Israel was the world's second leading bromine producer after the United States and accounted for about 36% of world bromine production in 2003. About 90% of Israel's bromine production was exported. From 1999 to 2002, Israel accounted for 88% of bromine imported by the United States. Bromine was also exported to the Netherlands, where DSGB had a plant to produce bromine derivatives (Lyday, 2004).

**Cement.**—Nesher Israel Cement Enterprises Ltd., which was the country's sole producer of cement, operated the Haifa, Har-Tuv, and Ramla plants (table 2). The International Cement Review (2003) forecasted that Israel's cement consumption would decline slightly to 4.4 Mt in 2003 compared with 4.47 Mt in 2002.

**Diamond.**—Israel continued to grow as a diamond-trading center as the domestic cutting industry declined and shifted toward higher value stones. In 2003, the value of imported rough diamond amounted to \$3.89 billion compared with \$4.41 billion in 2002 and \$2.73 billion in 1998. About \$2.23 billion of rough diamond was reexported in 2003. From 1998 to 2003, the value of exported polished diamond increased to \$5.53 billion from \$3.63 billion. About \$3.41 billion of polished diamond was reexported in 2003.

<sup>§</sup>References that include a section mark (§) are found in the Internet References Cited section.

Exports of polished diamond derived from local production fell to about 770,000 carats at a value of \$2.13 billion in 2003 from 1.8 million carats at a value of \$2.59 billion in 1998 (Singer, 2004b; Even-Zohar, 2000\$).

Israel's diamond manufacturers faced serious competition from countries with lower labor costs such as China and India. Other significant issues included shortages and high prices of rough diamond and stagnation in the market for polished diamond. The Israel Diamond Institute (IDI) planned to build a capital-intensive polishing service factory in Ramat Gan to help alleviate the problems of labor costs. This facility would be available to all manufacturers; the IDI expected to have the project operating by the end of 2004 (Katz, 2004; Singer, 2004a).

**Phosphate Rock.**—Rotem Amfert Negev Ltd. (a subsidiary of ICL) mined phosphate rock at Arad, Oron, and Zin. Rotem produced phosphoric acid and such fertilizers as monopotassium phosphate, single superphosphate, and triple superphosphate (TSP). Haifa Chemicals also produced phosphoric acid and phosphate fertilizers.

In 2003, Rotem's beneficiated production of phosphate rock fell to about 3.21 Mt compared with 3.47 Mt in 2002 because of the company's decision to reduce its phosphate stocks. Rotem increased its production of fertilizers by nearly 5% in 2003. As a result, the company increased its own consumption of phosphate rock and reduced sales to external customers (Israel Chemicals Ltd., 2004, p. 11).

**Potash.**—Dead Sea Works (DSW) used carnallite (a potassium muriate) from the Dead Sea as raw material for its potash plants. In 2003, the company's potash production rose to about 1.96 Mt compared with 1.92 Mt in 2002; most of this output was exported. Domestic consumers of DSW's potash included Haifa Chemicals, which was the world's leading producer of potassium nitrate. Haifa Chemicals' share of the world potassium nitrate market was about 50% in 2003.

**Silica.**—Negev Industrial Minerals (NIM) (a subsidiary of ICL) mined and beneficiated silica sand, which was consumed by the ceramics, construction, diecasting, and flat and container glass industries. NIM's silica sand was used by Phoenicia America-Israel (Flat Glass) Ltd., which was Israel's sole producer of float and pattern glass. National exports of glass and glass products rose to \$60.3 million in 2003 from \$57.6 million in 2002.

**Sulfur.**—In 2003, Israel's production of sulfur increased to 45,000 t from 36,000 t in 2002. Sulfur was produced at the Ashdod and Haifa refineries, which were operated by Oil Refineries Ltd. (table 2). Most of Israel's demand for sulfur was met through imports. Rotem produced sulfuric acid for the manufacture of fertilizers. Sulfuric acid production fell to 1.89 Mt in 2003 from 1.96 Mt in 2002 (table 1).

### *Mineral Fuels*

**Coal.**—Israel had no coal reserves and depended upon imports for all of its coal requirements. The country's consumption of coal increased to 12.53 Mt in 2003 compared with 12.2 Mt in 2002 and 9.28 Mt in 1998 (Israel Electric Corporation Ltd., 2004, p. 12).

**Natural Gas.**—In December 2003, Noble Energy Inc. started production at the offshore Mari-B gasfield in the Mediterranean Sea. Noble and its partners had an 11-year contract to supply Israel Electric Corporation Ltd. (IEC) with 18 billion cubic meters of natural gas. Production was expected to reach 2.8 million cubic meters per day in March 2004 and to rise eventually to 4.8 million cubic meters per day. The production facilities had a capacity of 17 million cubic meters per day. Reserves at Mari-B were estimated to be at least 28 billion cubic meters, and at Noa, about 6 billion cubic meters (Noble Energy Inc., 2003).

BG Group plc (BG) held a 90% interest in the Gaza Marine license, which was located in waters that were under the jurisdiction of the Palestinian authority. Exploration activities planned for 2003 at Gaza Marine were deferred until 2004 pending negotiations with potential customers in Israel. BG sought joint-venture partners to explore the Matan and Michal licenses, which were located in Israeli waters (BG Group plc, 2003, p. 36-37). The Yam Thetis consortium abandoned drilling at its Hana-1 offshore gas project in the Mediterranean Sea.

**Petroleum.**—Israel production and reserves of petroleum were not significant; most of the country's demand for crude petroleum was met through imports. Imports of fuels and lubricants rose to \$3.7 billion in 2003 from \$3.05 billion in 2002. At the end of 2003, Israel's reserves of crude petroleum were estimated to be 3.78 million barrels (Radler, 2003).

Oil Refineries Ltd. operated refineries in Haifa and Ashdod with capacities of 160,000 barrels per day (bbl/d) and 100,000 bbl/d, respectively (table 2). In 2003, Israel's exports of petroleum products were \$137.3 million compared with \$109.4 million in 2002.

### *Infrastructure*

In 2003, the IEC produced 45,608 gigawatthours (GWh) of electricity, which was an increase from 43,867 GWh in 2002 and 36,378 GWh in 1998. Coal-fired powerplants accounted for 79% of electricity generated; fuel oil, 17%; and natural gas and combined cycle, 4%. From 1998 to 2003, installed generating capacity increased to 10,117 megawatts (MW) from 8,324 MW. The largest powerplants were located at Orot Rabin, which had a capacity of 2,590 MW; Rutenberg, 2,250 MW; Eshkol, 1,206 MW; Riding, 528 MW; and Haifa, 426 MW (Israel Electric Corporation Ltd., 2004, p. 7-8).

Peak demand amounted to 8,570 MW of capacity in 2003. Israel consumed 41,721 GWh of electricity in 2003, which was an increase from 39,920 GWh in 2002 and 33,026 GWh in 1998. The chemicals and petroleum sector consumed 1,834 GWh of electricity in 2003; nonmetallic mineral products, 674 GWh; mining and quarrying, 506 GWh; basic metal, 203 GWh; and diamond, 38 GWh (Israel Electric Corporation Ltd., 2004, p. 14, 19, 39).

Israel's transportation network comprised nearly 16,300 kilometers (km) of paved highways and 610 km of railroads. There were more than 1,500 km of pipelines for petroleum and 100 km for natural gas.

## Outlook

The outlook for Israel's bromine, lead, magnesium, phosphate, potash, and salt industries depends heavily upon world market conditions for these commodities; the cement, crushed stone, gypsum, lime, and marble industries, however, depend mainly upon the strength of the Israeli economy. The International Monetary Fund (2004, p. 200) predicted that Israel's GDP would grow by 3.6% in 2004 and 3.5% in 2005. The global consumption of phosphate fertilizers was expected to increase by 2.7% per year between 2003 and 2008; output of phosphate rock and phosphoric acid was expected to grow at a similar rate (Jasinski, 2004, p. 57.4).

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TABLE 1  
ISRAEL: PRODUCTION OF MINERAL COMMODITIES <sup>1</sup>

(Metric tons unless otherwise specified)

Commodity <sup>2</sup>	1999	2000	2001 <sup>e</sup>	2002 <sup>e</sup>	2003 <sup>e</sup>
<b>METALS</b>					
Iron and steel, steel, crude <sup>c</sup>	280,000 <sup>3</sup>	270,000	220,000	150,000	150,000
Lead, refined secondary	13,000	13,000	20,000 <sup>3</sup>	22,000 <sup>3</sup>	25,000 <sup>3</sup>
Magnesium metal	24,800	31,700	34,000 <sup>3</sup>	28,000 <sup>r, 3</sup>	28,000
<b>INDUSTRIAL MINERALS</b>					
Bromine, elemental	181,000	210,000	206,000	200,000	200,000
Caustic soda <sup>c</sup>	41,200	44,200	44,900	50,500	50,500
Cement, hydraulic thousand tons	6,354	5,703	4,700	5,150	5,150
Clays:					
Brick clay	40,000	35,000	35,700	38,500	38,500
Flint clays	17,000	--	--	--	--
Kaolin	20,000	13,000	-- <sup>3</sup>	--	--
Diamond <sup>4</sup> thousand carats	1,833	1,672	1,367 <sup>3</sup>	1,188 <sup>3</sup>	771 <sup>3</sup>
Gypsum	140,000	130,000	133,000	144,000	140,000
Lime	340,000	350,000	299,000	283,000	283,000
Magnesia, Mg content	57,000	57,000	55,000	50,000	45,000
Phosphate:					
Phosphate rock, mine output:					
Beneficiated thousand tons	4,128	4,110	3,511 <sup>3</sup>	3,468 <sup>r, 3</sup>	3,208 <sup>3</sup>
P <sub>2</sub> O <sub>5</sub> content do.	1,310	1,305	1,115 <sup>3</sup>	1,100	1,020
Phosphatic fertilizers, P <sub>2</sub> O <sub>5</sub> equivalent:					
Monoammonium phosphate	7,000 <sup>r</sup>	11,000	13,000	13,000 <sup>r</sup>	12,000 <sup>3</sup>
Triple superphosphate	250,000	115,000	94,000 <sup>r</sup>	108,000	202,000 <sup>3</sup>
Phosphoric acid, P <sub>2</sub> O <sub>5</sub> equivalent	725,000	520,000	561,000 <sup>r</sup>	567,000 <sup>r</sup>	580,000 <sup>3</sup>
Potassium:					
Potash, K <sub>2</sub> O equivalent thousand tons	1,700 <sup>r</sup>	1,750 <sup>r</sup>	1,770 <sup>r, 3</sup>	1,920 <sup>r, 3</sup>	1,960 <sup>3</sup>
Potassium nitrate do.	266 <sup>5</sup>	220 <sup>5</sup>	257 <sup>5</sup>	289	290
Salt, marketed (mainly marine) do.	538	526	540 <sup>r</sup>	580	580
Sand:					
Silica sand	320,000	300,000	306,000	330,000	320,000
Other thousand tons	11,000	10,500	10,700	11,500	11,500
Stone:					
Crushed do.	30,000	29,000	29,600	31,900	31,900
Dimension, marble	94,520	127,880	131,000	141,000	141,000
Sulfur:					
Byproduct from petroleum thousand tons	31	38	35 <sup>3</sup>	36 <sup>3</sup>	45 <sup>p</sup>
Sulfuric acid:					
Gross weight do.	1,814	1,875	1,900 <sup>3</sup>	1,956 <sup>3</sup>	1,894 <sup>p</sup>
S content do.	593	613	621 <sup>3</sup>	639 <sup>3</sup>	619 <sup>p</sup>
<b>MINERAL FUELS AND RELATED MATERIALS</b>					
Gas, natural, dry thousand cubic meters	10,739	9,653	9,600	8,400	8,400
Petroleum:					
Oil shales	449,400	390,000	415,000 <sup>3</sup>	457,900 <sup>3</sup>	436,500 <sup>3</sup>
Crude 42-gallon barrels	31,300 <sup>r</sup>	31,300 <sup>r</sup>	29,800 <sup>r</sup>	34,300 <sup>r</sup>	22,400 <sup>3</sup>
Refinery products:					
Liquefied petroleum gas thousand 42-gallon barrels	5,433 <sup>r</sup>	5,414 <sup>r</sup>	6,045 <sup>r, 3</sup>	5,591 <sup>r, 3</sup>	5,500 <sup>3</sup>
Gasoline do.	15,778 <sup>r</sup>	14,676 <sup>r</sup>	16,911 <sup>r, 3</sup>	18,863 <sup>r, 3</sup>	19,034 <sup>3</sup>
Naptha do.	7,110 <sup>r</sup>	7,915 <sup>r</sup>	7,089 <sup>r, 3</sup>	3,798 <sup>r, 3</sup>	4,376 <sup>3</sup>
Kerosene do.	8,861 <sup>r</sup>	9,428 <sup>r</sup>	8,195 <sup>r, 3</sup>	7,886 <sup>r, 3</sup>	8,639 <sup>3</sup>
Distillate fuel oil do.	21,227 <sup>r</sup>	21,649 <sup>r</sup>	23,424 <sup>r, 3</sup>	21,169 <sup>r, 3</sup>	22,208 <sup>3</sup>
Residual fuel oil do.	25,832 <sup>r</sup>	26,039 <sup>r</sup>	23,787 <sup>r, 3</sup>	22,432 <sup>r, 3</sup>	22,910 <sup>3</sup>
Other <sup>e</sup> do.	1,950 <sup>r, 3</sup>	1,900 <sup>r</sup>	2,000 <sup>r</sup>	2,000 <sup>r</sup>	2,200
Total do.	86,191 <sup>r</sup>	87,021 <sup>r</sup>	87,451 <sup>r, 3</sup>	81,739 <sup>r, 3</sup>	84,867 <sup>3</sup>

See footnotes at end of table.

TABLE 1--Continued  
ISRAEL: PRODUCTION OF MINERAL COMMODITIES <sup>1</sup>

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<sup>6</sup>Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown . <sup>p</sup>Preliminary. <sup>r</sup>Revised. -- Zero.

<sup>1</sup>Table includes data available through September 30, 2004.

<sup>2</sup>In addition to the commodities listed, imported gemstones are cut, and secondary refined zinc, such fertilizers as monopotassium phosphate, and a variety of crude construction materials are produced, but available information is inadequate to make estimates of output.

<sup>3</sup>Reported figure.

<sup>4</sup>Imported diamond cut in Israel.

<sup>5</sup>Exports; based on other countries' imports of potassium nitrate from Israel.

TABLE 2  
ISRAEL: STRUCTURE OF THE MINERALS INDUSTRY IN 2003

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies		Location of main facilities	Annual capacity
Bromine		Dead Sea Bromine Group (DSBG) (Israel Chemicals Ltd. (ICL), 100%)		Sdom	250.
Cement		Nesher Israel Cement Enterprises Ltd.		Ramla	5,000 clinker; 3,600 cement.
Do.		do.		Haifa	2,000 clinker; 450 cement.
Do.		do.		Har Tuv	1,000 clinker; 700 cement.
Lead, refined secondary		Harkunas Lead Works		Ashdod	25.
Magnesium:					
Magnesia		Dead Sea Periclase Ltd. (DSP) (ICL, 100%)		Mishor Rotem	95.
Do.		Tateho Dead Sea Fused Magnesia Co. (DSP, 50%, and Tateho Chemical Industries Co. of Japan, 50%)		do.	13.
Magnesium, refined		Dead Sea Magnesium Ltd. (ICL, 65%, and Volkswagen AG of Germany, 35%)		Sdom	35.
Natural gas	million cubic meters	Noble Energy Inc.		Mari-B gasfield	6,200.
Petroleum:					
Crude	thousand 42-gallon barrels	Lapidoth Israel Oil Prospectors Corp.		Heletz-Brur	22.
Do.	do.	do.		Kochav	9.
Refined	do.	Oil Refineries Ltd. (Government, 100%)		Haifa	58,400.
Do.	do.	do.		Ashdod	36,500.
Potassium:					
Potash		Dead Sea Works (DSW) (ICL, 100%)		Sdom	2,800.
Potassium nitrate		Haifa Chemicals		Haifa	300.
Do.		do.		Mishor Rotem	200.
Phosphate:					
Phosphate rock		Rotem Amfert Negev Ltd. (ICL, 100%)		Arad, Oron, and Zin	5,500.
Phosphatic fertilizers		do.		Rotem	NA.
Do.		Haifa Chemicals Ltd.		Haifa	NA.
Phosphoric acid <sup>1</sup>		Rotem Amfert Negev Ltd.		Rotem	640.
Do.		Haifa Chemicals Ltd.		Haifa	NA.
Salt		Dead Sea Works		NA	700.
Do.		Israel Salt Industries Ltd. (subsidiary of Danker Group)		Atlit, Eilat, and Kalia	NA.
Steel:					
Crude		Hod Metals		Akko	200.
Do.		Yehuda Steel Ltd.		Ashdod	150.
Rebar		do.		Gedera	230.
Do.		do.		Ashdod	120.
Do.		do.		Akko	220.
Do.		Hod Metals		Kiryat Gat	100.
Sulfur		Oil Refineries Ltd.		Ashdod	40.
Do.		do.		Haifa	33.
Sulfuric acid		Rotem Amfert Negev		Rotem	NA.
Zinc		Numinor Chemical Industries Ltd.		Maalot	NA.

NA Not available.

<sup>1</sup>P<sub>2</sub>O<sub>5</sub> equivalent.